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ABSTRACT

Preservice teachers have pre-existing conceptions of teaching that develop throughout many years of being students in the presence of teachers. Teacher educators are faced with the challenge of making the invisible parts of being a teacher visible to their students. This paper presents some of the activities, especially related to videotaped case studies, that were found to be effective in helping preservice science teachers recognize the diversity in their classrooms and the effort that it takes to meet the needs of all students. (Contains 36 references.) (WRM)

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by

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PUSHING THE COMFORT ZONE: CONFRONTING THE PERCEPTIONS OF TEACHING AND CLASSROOM CULTURE

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Pre-service teachers often come with very strong views of what it means to be a teacher. After all, they have experienced many years of being a student in the presence of teachers. From a student perspective they have a set of characteristics in their mind that define who a good teacher is and what kinds of things they do. In education courses and even during student teaching it is common to hear statements from pre-service teachers such as, "If this were my class I would never allow students to just shout out answers, it makes the class so chaotic" or "There is no excuse for late homework; if a student doesn't get the work done it is not the teacher's problem" or "If schools would just kick out the trouble makers, kids who want to learn could." When asked about these responses and why they feel this way, preservice teachers usually say that they are echoing frustrations they felt as a student. As individuals who are considering teaching as a profession, for the most part, these individuals have been successful in school. They point out that they were often frustrated by the behavior of a peer who they saw as interrupting their learning, and frustrated by teacher and administrative decisions that appeared to give breaks to some students, and kept more disruptive students in the classroom.

Intellectually they know that a teacher is responsible for all of the students in their class. Through earlier education courses they have come to know some of the history and goals of

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schooling. By the time they get to a methods course, they can often talk quite eloquently about teachers' responsibility to meet the needs of all students. They will often frame this discussion in terms similar to those of the national reform efforts (American Association for the Advancement of Science, 1989; National Research Council, 1996). These reforms call for quality education for all students regardless of cultural background, socio-economic background, physical condition or learning style.

> "All students, regardless of sex, cultural or ethnic background, physical or learning disabilities, future aspirations, or interest in science, should have the opportunity to attain high levels of scientific literacy." (National Research Council, p. 22)
>
> Language and sex, or economic circumstances must no longer be permitted to be factors in determining who does not receive a good education in science, mathematics, and technology. (American Association for the Advancement of Science, p. 214)

These goal statements for science education clearly indicate the student populations to whom all science teachers are responsible. *Science for All Americans* (American Association for the Advancement of Science, 1989) makes addressing student diversity a charge in it's phrasing "must no longer be permitted." This moves past the passive "must be aware off" or "should take into consideration" that often is typical of the treatment that diversity receives in methods courses. These two quotes from national reform documents provide the framework for the range and type of diversity issues that this methods course attempted to address.

One of the barriers that face teacher educators lies in the conceptions of teaching and classrooms that pre-service teachers bring to their education classes. The images of teaching

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with which pre-service teachers come to education classes are in large part based on their years as students. It is common for teacher education candidates, after an intensive field experience, to comment about how much schools have changed since they were in school. In secondary education, we teacher educators are somewhat amazed that they actually say this, when most of them are less than four years away from their last day as a high school student. It is during these intensive field experiences that they first start to view the classroom and teaching more from the teacher perspective than as a student. It is here that pre-service teachers start to explore many aspects of their chosen career, and start to understand that what they saw as students in a classroom was only part of the teacher's role.

It is part of our task as teacher educators to make the invisible parts of teaching visible to our candidates. As students, they were not (as a rule) explicitly aware of the local, state or national guidelines shaping curriculum decisions. They were not aware how a teacher makes decisions about whether a project should be done individually or as a group project. As they progress through a teacher education program, they learn the vocabulary used by educators, and by the time they take a methods class and enter student teaching, most pre-service teachers can talk or write quite eloquently about the role of science in everyday life, and why it is important for their students to learn science. However, this dedication to teaching <u>all</u> students appears to falter when confronted with activities that push the pre-service teachers to take ownership of

complex situations and propose alternative actions, or when, as student teachers, they are faced with teaching in a classroom with a diverse student population.

This presentation will share some of the activities that this presenter has found productive in helping pre-service teachers recognize the diversity in their classrooms, and the effort that it takes to effectively meet the needs of their students. These ideas and activities draw on a wide variety of previous teacher education work. In particular, this work is strongly influenced by work on reflective practice (Posner, 1996; Schon, 1983; Schon, 1987; Winitzky, 1989), case study approaches (Harrington & Garrison, 1992; Parker & Tiezzi, 1992; Stake & Easley, 1978; Sykes & Bird, 1992; Wassermann, 1993) portfolio and alternative assessment models (Chittenden, 1991; Cohen, 1994; Haney, 1991; Hein, 1991; Maeroff, 1991; Perrone, 1991a; Perrone, 1991b; Shavelson, Baxter & Pine, 1992; Stock, 1991; Tamir, 1993; Zessoules & Gardner, 1991). It also builds on work done on the identification and development of strategies for inclusive classroom settings (Ford, Davern & Schnorr, 1992; Giangreco, 1992; Graden & Bauer, 1992; Sapon-Shevin, 1992; Stainback & Stainback, 1992; Stainback, Stainback & Jackson, 1992a; Stainback, Stainback & Moravec, 1992b; Villa & Thousand, 1995).

Using Video Resources as Opportunities for Reflection

A wide variety of video resources are available for use in a science methods course. The resources highlighted below are ones that I've explored with the focus on meeting the needs and learning styles of all students. Provided for each video is a brief description of the video episode

and examples of questions posed to pre-service teachers for consideration prior to watching the tape, or to respond to after viewing the video clip. Case materials, both written and video, have long been used in education, and each year additional ways of making use of these resources are being explored (Harrington & Garrison, 1992; Parker & Tiezzi, 1992; Stake & Easley, 1978; Sykes & Bird, 1992; Wassermann, 1993). The following descriptions of videos and related activities are meant as the beginning of a conversation of possibilities.

How Difficult Can This Be? (Lavoie, 1989)

This video tape may not seem at first like an ideal tape to use in a science methods class, but based on student feedback is a very powerful tape whose images stick in a student's mind long after the course ends. This tape is approximately 70 minutes long and allows the viewer to feel like a participant in a workshop lead by Richard Lavoie as he helps parents, teachers, students, and community members experience what it might feel like to have a learning disability. In this video he describes several fairly common types of learning disabilities, and provides some strategies for how teachers could modify their instruction to support a student who may have this learning style.

The tape is very useful in a variety of ways, but two sections in particular highlight very common difficulties that many of our students, as well as experienced teachers, face. One of the segments deals with perception, and points out that a "b" (depending on orientation) can also look like a p, d, or q, each with its own traits, sounds and uses. After viewing the tape, methods

students brainstorm different concepts or skill areas in science where this type of learning style could really cause difficulties. A short list of often-named concepts that students have come up with in the last couple of years includes: microscopes, stereo chemistry (left or right handedness), chemical equations, cyclic reaction sets (krebs, nitrogen, etc.), diagrams for setting up labs, orientation drawings used in physics and astronomy (phases of the moon, vectors, etc.), any left or right hand type of rule explanation

In one of the other powerful images from the tape, the presenter gives the workshop participants a list of words and asks them if they have any difficulty with any of the words, or if there are any words with which they are not familiar. The words in the list are: are, making, between, only, consists, often, continuously, with, corresponding, one, curve, points, draws, relation, variation, set, graph, table, if, values, isolated, variables, and known. After getting their assurance that they know all of the words, he presents them with the following paragraph.

> "If the known relation between the variables consists of a table of corresponding values, the graph consists only of the corresponding set of isolated points. If the variables are known to vary continuously, one often draws a curve to show the variation." (Basic College Math, M. Michael Michaelson, 1945)

Only an engineer in the group can make sense of the paragraph. Most of the students in a methods course can also make sense of the paragraph, but the tape shows that a cross section of the general public had difficulty with this paragraph. This reinforces a running theme through the course that sometimes the language we use in science and mathematics is not as accessible as we (who are interested in the fields) may believe.

In science classes we often use vocabulary that is commonly used in day-to-day life, but has a very specific definition when used in a science classroom. Students will often indicate to us, as science teachers, that they understood all the vocabulary or readings, but a bit of questioning and observation indicates to us that they do not have that level of understanding. This finding highlights the difference between decoding and understanding. As a methods class, we often brainstorm a list of terms or words that might cause difficulty if not explicitly addressed. A partial list of these terms includes: light, sound, wave, food, air, oxygen, system, model, speed, weight or mass, see, measure, position, orientation, color, dark, time, reflection.

At the conclusion of this tape students are asked to add 3 things to their learning portfolio: 1) A beginning list (that they can add to as they begin teaching) of perception or orientation concepts or skills that they should be prepared to address; 2) a parallel list of terms or samples of writing that use common words or phases in specific ways that their students should be made aware of; and 3) an action plan for how, as teachers, they could learn more about or work with other teachers, parents, community members to meet the needs of students with a range of learning styles and abilities. Specifics about "action plans" are discussed in a later section of the paper.

Failing at Fairness: Part 2 (Sadker & Sadker, 1994b)

This video clip, from NBC's Dateline program, is a second look at Myra and David Sadker's work. Based on their book of the same name (Sadker & Sadker, 1994a) (Sadker &

Sadker, 1994b) this tape takes the viewer to a high school physics class at a magnet high school. The physics teacher at this school offered a females-only section of his physics course. In this section of the course, he moved away from his traditional drill-and-practice style of physics instruction, made the course much more hands-on, and used multiple explanations, in different contexts. Unlike his traditional course where most students worked individually and in a more competitive atmosphere of racing to the right answer, in this all-female section he gave students the opportunity to work in small groups and explore the physics concepts in multiple ways.

This video tape rarely evokes neutral emotions from the students. Male students often view it as one more case of "male bashing" and female students often view it as something that may have been important a few years ago, but is no longer an issue (after all, they are females in science). The class is generally in agreement that the all-female section of the class is a better physics course, and that all students should have access to this type of learning. Looking at this instruction in light of the national reforms reinforces this view that all students should experience this type of teaching. It is only during their field experiences that their dedication to this style of teaching starts to fall apart, when they realize how much thought and planning is required to be able to give students multiple examples of concepts and hands-on opportunities.

To help students recognize that gender differences still exist in science classes, students are asked to survey the chemistry and physics teachers in the high schools where they have field experiences. When whole-class data is reported back, the pattern of fewer females in the

advanced sciences in high school becomes clearer. Individual reports and estimates of the breakdown often do not bring this situation to light. Along the same lines, methods students audio tape or video tape one of the lessons that they teach in the field, and keep a tally of males versus females called on, or who asked questions. To keep track of this, the methods students fill out a log sheet that tracks teacher/student questioning patterns. Figure 1 is an excerpt from a pre-service teacher's (Sarah, May 1996) question analysis log. This type of analysis was expected three times during student teaching, once for the cooperating teacher and as part of the analysis of the videotapes of their lessons:

Figure 1

Sample Question Analysis Log

Question/Who Asked?	Type	Response	Responder
Who remembers what we were discussing yesterday?- T	R	Living things	Rob
		Biogeni...something	Tim
Biogenesis? OK -- what else? - T	R	maggots and meat	Sean
		Pasteur	Christy
Do we have to write this down? - F	P	This should be in your notes f yesterday.	T

Question Types: R=recall, I=inquiry (open ended), P=procedure

A High School Science Lesson with Barbara Neureither (North Central Regional Educational Laboratory, 1995)

In this video lesson, a high school biology teacher describes her approach to teaching and her views on how students make sense of science and build science understanding. This interview is interspersed with clips from her classroom. The viewer is given a glimpse of the hidden part of teaching, the planning and thought processes involved in teaching.

This tape is used to model the instructor's expectations for the students, an example of what they should be able to do and explain as part of their rationale for a lesson or unit. In the interview, Barbara talks about the role of the state guidelines in her planning and her goals for students. Through her interview and classroom segments, the observer gets to see both the planning process and how this is enacted in the classroom.

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While watching the tape, students are asked to identify Barb's main goals in teaching and her teaching philosophy. They are also asked to identify the strategies that they see Barb talk about and use during the tape. In doing this, they are to provide evidence that the ideals Barbara talks about in her teaching can also be observed in the classroom setting. The goals of using this tape are: 1) to use it as a reference point for discussion and as a prompt for methods students to evaluate their field experiences, 2) as a tool for working on developing their own teaching styles and philosophies. Using the "right" words is not sufficient -- any observer who enters your room should be able to have some sense of what you value and your goals for your students. To jump-start this issue, at the beginning of the semester students write a journal entry that describes their ideal lesson. Then, this assignment is repeated at the end of the semester.

At the beginning of the semester, student responses to this assignment are usually quite brief, and filled with many of the words that the pre-service teacher believes the instructor wants to hear. Alternately, the student may provide a description of a high school classroom in which they were successful (in the student role). Sometimes their descriptions seem to be based on what they had hoped they would see in their field experiences. Their descriptions often focus on student behavior and teacher actions, with less of a focus on content. Following is a fairly typical journal response for the beginning of the semester:

> In my ideal lesson the students would all be really interested in what I am talking about. The students are polite to each other and have done their homework. They ask really good questions and don't interrupt me or other students. This class might be following a lab or some other activity. In this ideal set up we would have a great lab set up and all

the materials we need to do labs. Students would be involved in lots of hands on activities. (Matt, Winter 1997)

This early journal response starts a written conversation between the pre-service teacher and the instructor. Instructor responses offer prompts and questions back about content, what the pre-service teacher would consider to be a "good" question, what kinds of facilities are needed to do labs, what type or what is the structure of labs, or whether work is done individually or in cooperative groups.

The similar journal response at the end of the semester is usually more detailed. Instead of building descriptions on phrases, such as: hands-on, cooperative learning, and respectful, content plays a more central role in these descriptions, and they provide details about what the students would be doing and what the teacher would be doing.

Valerie: Exploring the relationship between doing science and teaching science (Rosebery & Ogonowski, 1996)

This video tape asks observers to think about the relationship between learning and doing science, and teaching science. One of the quotes from Valerie is, "high school really killed science for me." It is clear from the tape that this woman is a bright, inquisitive person, but her high school and college science experiences were neither enjoyable nor enlightening.

The follow-up classroom discussion and journal assignment that are used with this tape focus on identifying features of science classes in high school and college that make the classes

so unpleasant, and on thinking about specific steps or strategies that a teacher could use to identify this student perception of science, and to work toward modification of this view. The following list is one that students Spring of 1997 brainstormed, and to which they responded in their journal entries:

What "kills" science for some high school students?

1. lots of vocabulary and definitions
2. story problems
3. boring lectures
4. too many notes
5. always having to do all the work
6. never getting to DO anything, just read about it or see videos
7. long lab reports
8. lots of calculations
9. rowdy class/horseplay
10. not enough equipment
11. hard tests that aren't over class stuff
12. not relevant/real

Students chose 2-3 things from this list to address in their action plans. Each semester, this activity had been done. The list varied a little, but the general theme of too much passive learning was persistent.

<u>This question is just too, too, too easy</u> (Warren & Rosebery, 1994)

This video tape allows observers to watch a science discussion in a Haitian-Creole bilingual classroom. The conversation occurs in Haitian-Creole with English dubbing. This tape shows a very interesting discussion in which students question each others' interpretations and

conclusions, and as they try to develop an explanation, they push each other for evidence. Just stating information is not accepted as fact here; students challenge each other and ask for clarification.

The instructor's original intent in choosing to show this tape to methods students was to provide an example of a classroom where students actively tried to make sense of science, were engaged in conversation, and had a truly interactive experience in a science classroom. The tape was not given a great deal of set up, but students were asked to keep track of the various science concepts students were using, in order to be able to describe the role of evidence in the discussion. Their reaction to the tape was very strong, but not in the way that had been anticipated.

The pre-service teachers expressed shock at the discussion; they could not believe how rude the students were with each other. While the tape was chosen to show a strong example of scientific discussion in a classroom, the pre-service students viewed the classroom as out of control. Yet, in the classroom shown, students weren't looking to the teacher for support or verification, they were demanding it of each other. Students in this class openly challenged each other with raised voices. My predominately white middle class pre-service teachers found this conversation style very problematic, and had great difficulty in seeing the science part of this interaction. The style of conversation had them focusing instead on behavior, and it was very

difficult to convince them to look past the conversation context in order to focus on the content of the conversation.

The most effective use of this tape in this secondary science methods course is still under constant revision and modification. One strategy used with moderate success is showing the tape twice. The first time, students are asked to write down the dynamics of the classroom interaction; the second time they are asked to focus on the role of evidence, and identifying the range of science concepts that are implicitly or explicitly part of the conversation. The journal assigned is: What does a teacher need to do to prepare students to have a scientific discussion/ argument? What types of content could be taught in this manner? What behavior norms need to be established prior to the discussion? What role does the teacher play during these discussions?

Additional Activities

Beyond the use of video cases and the associated assignments that go with each of the videos, there are five other activities that students complete that build awareness of their individual beliefs, and provide evidence of their plans and commitment for addressing diversity in their classrooms. These activities are: 1) Teacher Belief Inventory, 2) Student Belief Inventory, 3) Action Plans, 4) Unit Plans, and 5) a Resource Portfolio. Each of these types of activities are briefly described in the following sections, along with student reactions to some of these assignments.

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Teacher Belief Inventory and Student Belief Inventory

One of the required texts for the field component of the methods course is a book by George Posner call *Field Experience: A guide to reflective teaching* (Posner, 1996). The activities in this text prompt students to reflect and write about the community their schools are located in, the school, the classroom, cooperating teacher and students where they are placed for their field experiences. The appendix of this text has two inventories that students are asked to complete and to use to analyze their beliefs about teaching and learning. These two inventories share most of the same categories: control, diversity, learning, role of teacher, and school and society. The teacher inventory also includes a category for knowledge.

The inventories have a parallel set of questions, for the student inventory they answer based on their experiences as a student, and for the teacher inventory as if they were in charge of a classroom. It is not uncommon for students to answer quite differently on the two inventories. Once the discrepancies, especially in the areas of control and role of teacher are pointed out to them they are always a little embarrassed. As a student they want control and generally want the teacher to be personable; as a teacher they believe that teachers should have a great deal of autonomy of the curriculum and the classroom, and view themselves as disciplinarians who will relax rules over time. At one level these individuals are very consistent -- they want control, what they come to realize is that in their classrooms students who are very much like them also want control, so a compromise on both sides may be called for.

There is often a parallel set of issues when it comes to examining beliefs on diversity.

The inventories use a 4 point scale with 1 being 'strongly agree' and 4 being 'strongly disagree'.

For the student inventory the diversity statement is:

As a student I want to be treated like all other students when it comes to each of the following:

a) methods
b) evaluation criteria
c) time offered to students
d) teacher's expectations for my achievement level
(Posner, 1992, p. 130)

The teacher inventory statements include:

1. I would employ multiple and diverse criteria to evaluate learners. It is not fair to use the same criteria to evaluate all learners.
2. If I taught classes that differed with regard to learners' academic ability; I would teach them differently.
3. I would not expect learners from economically disadvantaged backgrounds to assume the same degree of responsibility for their learning as learners from more economically advantaged backgrounds.
4. One of the main problems in classrooms today is diversity among pupils.
5. There should be set standards for each grade level and subject, and as a teacher I would evaluate all learners according to these standards.
6. I could probably to most for learners who want to learn.
7. I would attempt to devote more of my time to the least capable learners in order to provide an equal education for all.
8. I would lower my expectations regarding academic performance for those learners who come from economically disadvantaged backgrounds.

(Posner, 1992, p. 132)

The results of these inventories are shared in small group discussions and students are asked to write summary statements about their beliefs in each of these categories. By examining their

beliefs in both student and teacher roles, implicit beliefs become explicit. This sets a context for many of the other activities in the course.

Action Plans

Throughout the semester students are asked to develop action plans in three areas: Learning styles; Gender; and Cultural Diversity. An action plan includes a summary of the current situation and eight to ten specific steps or resources that could be implemented. For each of these areas students view videotapes, read articles, and participate in class discussions or activities, prior to developing these action plans. Some sample areas that students usually address in these action plans include: for learning styles, learning styles and abilities, and multiple strategies; for gender, physics as female-friendly, and learning styles; for cultural diversity, ethnicity and conversation style. A sample action plan is provided in Appendix A.

Unit Plans

Students plan and teach a three-week unit in local high school and middle school settings during this course. A major part of their grade is based on their unit plans and their ability to analyze the effectiveness of their units. Issues of diversity sometimes get lost as they develop these units. Evidence of attention to diversity issues is evaluated in the unit plan by examining it for the images of content it represents, variety of strategies, variety of assessments, and daily reflections and analysis of the unit. This activity appears to be one of the places where

previously voiced commitments to diversity issues seem to evaporate. In the midst of planning their unit and teaching their unit, students are often overwhelmed with the richness of the setting and the complexity of planning and teaching. Their focus is on breaking down content and structuring class activities, and they have a difficult time taking into consideration issues of diversity.

When the students do attend to these issues, evidence of this attention may be shown in a great variety of ways. In examining these unit plans, this instructor uses questions to guide evaluation of the effort to address issues of diversity, for example:

1. when history of science advancements are presented, are the contributions of several cultures discussed?
2. are most concepts presented in more than one style (visual, auditory, tactile)
3. do students have more than one way of demonstrated their understanding of a concept?
4. do the multiple forms of assessment draw on different skills and learning preferences?

Resource Portfolio

Through the semester students are encouraged to develop and maintain a resource portfolio. This portfolio is meant to be the beginning of an organized format for collected teaching resources such as:

1. the unit that they have developed,
2. lesson plans developed for this course and for other courses,
3. activities shared by other classmates or cooperating teachers in the field,
4. a list of agencies, professional organizations, nonprofit organizations, corporations or individuals (with contact information) who could be useful,
5. reflections of class activities or field experiences.

This portfolio also contains pieces that will eventually (during student teaching) become part of their professional portfolio, such as early draft versions of their teaching philosophy statements, resumés, job search letters, letters of reference, and possibly videos of microteaching or classroom experiences.

Students are encouraged to use their reflection on the student and teacher inventories to write their educational philosophy statement. Evidence for commitment to diversity can be found imbedded in these philosophy statements (an example is located in Appendix B), in the activities the students collect and value highly enough to include in their portfolios, and in the types and range of organizations represented in their portfolios.

Conclusion

We cannot afford to let pre-service teachers view the responsibility of teaching diverse populations as something they will do when they have a better handle on teaching and "life settles down a bit." Teaching and learning are life-long processes and constant modifications are always necessary. As teacher educators it is our responsibility to help students see those invisible parts of teaching and planning that allow teachers to make accommodations and modifications to best meet the needs of individual students.

One of the dilemmas of secondary science education is that often these pre-service teachers have been very successful in school, and they truly love their content. Building the awareness that teaching is much more than content knowledge is often the first barrier that science

educators face in working with pre-service teachers. As science-discipline specialists, secondary level educators can easily get tunnel vision and think mainly about their content. This is appropriate, as long as they also recognize that preparing to teach that content means taking into account the full richness of the school and student context. Planning for diversity can not be passive. No teacher intentionally makes the content inaccessible to students, though that is what often happens when diversity is not directly taken into consideration during planning and instruction.

This instructor has chosen not to make diversity a topic for the week, or to focus on just a couple of aspects of diversity. Instead, it is woven through the fabric of this course and program as a running theme that is manifested in a variety of ways, as demonstrated by these activities. It is the goal of this instructor to keep this from being left to the hidden part of teaching.

This paper is not intended to be a formula for the "best way" of developing these ideas in a science methods course. The goal of this paper is to further the conversation, put forward some strategies with sample results, and provoke further conversation about these issues. We cannot allow pre-service teachers to merely adopt the language used to talk about diversity, nor is it sufficient to have a couple of activities that support a variety of learning styles. It must be a significant part of each and every day and class period.

References

American Association for the Advancement of Science. (1989). *Science for all Americans: A project 2061 report on literacy goals in science, mathematics and technology*. Washington, D.C.: AAAS.

Chittenden, E. (1991). Authentic Assessment, Evaluation, and Documentation of Student Performance. In V. Perrone (Ed.), *Expanding Student Assessment*, (pp. 22-31). Washington, D.C.: Association for Supervision and Curriculum Development.

Cohen, E. (1994). *Designing groupwork: Strategies for the heterogeneous classroom.* (2nd. ed.). New York: Teachers College Press.

Ford, A., Davern, K., & Schnorr, R. (1992). Inclusive Education: "Making Sense" of the Curriculum. In S. Stainback & W. Stainback (Eds.), *Curriculum Considerations in Inclusive Classrooms: Facilitating Learning for All*, (pp. 37-64). Baltimore: Paul H. Brooks Publishing Co.

Giangreco, M. F. (1992). Curriculum in Inclusion-Orientated Schools: Trends, Issues, Challenges, and Potential Solutions. In S. Stainback & W. Stainback (Eds.), *Curriculum Considerations in Inclusive Classrooms: Facilitating Learning for All*, (pp. 239-264). Baltimore: Paul H. Brooks Publishing Co.

Graden, J. L., & Bauer, A. M. (1992). Using a Collaborative Approach to Support Students and Teachers in Inclusive Classrooms. In S. Stainback & W. Stainback (Eds.), *Curriculum Considerations in Inclusive Classrooms: Facilitating Learning for All*, (pp. 85-100). Baltimore: Paul H. Brooks Publishing Co.

Haney, W. (1991). We Must Take Care: Fitting Assessments to Functions. In V. Perrone (Ed.), *Expanding Student Assessment*, (pp. 142-163). Washington, D.C.: ASCD.

Harrington, H. L., & Garrison, j. W. (1992). Cases as Shared Inquiry: A Dialogical Model of Teacher Preparation. *American Educational Research Journal, 29*(4), 715 - 736.

Hein, G. (1991). Active Assessment for Active Science. In V. Perrone (Ed.), *Expanding Student Assessment*, (pp. 106-131). Washington, D.C.: ASCD.

Lavoie, R. D. (1989). *How difficult can this be? The F.A.T. City workshop* [video]. Greenwich, CT: Eagle Hill Foundation, Inc.

Maeroff, G. I. (1991). Assessing Alternative Assessment. *Phi Delta Kappan*(December), 272 - 281.

National Research Council. (1996). *National Science Education Standards*. Washington, D.C.: National Academy Press.

North Central Regional Educational Laboratory (1995). *A high school science lesson with Barbara Neureither* [School development library videotape]. Oak Brook, IL: North Central Regional Educational Laboratory.

Parker, M. B., & Tiezzi, L. J. (1992). Exploring Teaching with Cases. In S. Feinman-Nemser & H. Featherstone (Eds.), *Exploring Teaching: Reinventing an Introductory Course*, . New York: Teachers College Press.

Perrone, V. (Ed.). (1991a). *Expanding Student Assessment*. Washington, D.C.: ASCD.

Perrone, V. (1991b). Moving Toward More Powerful Assessment. In V. Perrone (Ed.), *Expanding Student Assessment*, (pp. 164-165). Washington, D.C.: ASCD.

Posner, G. (1996). *Field Experience: A guide to reflective teaching*. (4th ed.). White Plains, New York: Longman.

Rosebery, A. S., & Ogonowski, M. S. (1996). *Valerie: Exploring the relationship between doing science and teaching science* [videotape and pamphlet]. Portsmouth, NH: Heinemann -- TERC.

Sadker, M., & Sadker, D. (1994a). *Failing at fairness: How our schools cheat girls*. New York: Simon and Schuster.

Sadker, M., & Sadker, D. (1994b). *NBC Dateline: Failing at Fairness II* [video]. New York: National Broadcasting Company.

Sapon-Shevin, M. (1992). Celebrating Diversity, Creating Community: Curriculum that Honors and Builds on Differences. In S. Stainback & W. Stainback (Eds.), *Curriculum Considerations in Inclusive Classrooms: Facilitating Learning for All*, (pp. 19-36). Baltimore: Paul H. Brooks Publishing Co.

Schon, D. A. (1983). *The Reflective Practitioner*: Basic Books.

Schon, D. A. (1987). *Educating the Reflective Practitioner*. San Francisco: Jossey-Bass.

Shavelson, R. J., Baxter, G. P., & Pine, J. (1992). Performance Assessments: Political Rhetoric and Measurement Reality. *Educational Researcher, 21*(4), 22-27.

Stainback, S., & Stainback, W. (Eds.). (1992). *Curriculum Considerations in Inclusive Classrooms: Facilitating Learning for All Students*. Baltimore: Paul H. Brooks Publishing Co.

Stainback, S., Stainback, W., & Jackson, H. J. (1992a). Toward Inclusive Classrooms. In S. Stainback & W. Stainback (Eds.), *Curriculum Considerations in Inclusive Classrooms: Facilitating Learning for All*, (pp. 3-18). Baltimore: Paul H. Brooks Publishing Co.

Stainback, W., Stainback, S., & Moravec, J. (1992b). Using Curriculum to Build Inclusive Classrooms. In S. Stainback & W. Stainback (Eds.), *Curriculum Considerations in Inclusive Classrooms: Facilitating Learning for All*, (pp. 65-84). Baltimore: Paul H. Brooks Publishing Co.

Stake, R., & Easley, J. (1978). *Case studies in science education.* Urbana, IL: University of Illinois.

Stock, P. L. (1991). The Rhetoric of Writing Assessment. In V. Perrone (Ed.), *Expanding Student Assessment*, (pp. 72-105). Washington, D.C.: ASCD.

Sykes, G., & Bird, T. (1992). Teacher Education and the Case Idea. *Review of Research in Education, 18*.

Tamir, P. (1993). A Focus on Student Assessment. *Journal of Research in Science Teaching, 30*(6), 535-536.

Villa, R. A., & Thousand, J. S. (Eds.). (1995). *Creating an inclusive school*. Alexandria, VA: Association for Supervision and Curriculum Development.

Warren, B., & Rosebery, A. S. (1994). *This question is just too, too, too easy!" Scientific discussion in a bilingual classroom*. Cambridge, MA: TERC.

Wassermann, S. (1993). *Getting down to cases: Learning to teach with case studies*. New York: Teachers College Press.

Winitzky, N. E. (1989,). *Moving Research into Practice: The Effects of Various Forms of Training and Clinical Experiences on Preservice Students' Knowledge, Skill, and Reflectiveness.* Paper presented at the Annual Meeting, San Francisco.

Zessoules, R., & Gardner, H. (1991). Authentic Assessment: Beyond the Buzzword. In V. Perrone (Ed.), *Expanding Student Assessment*, (pp. 47-71). Washington, D.C.: ASCD.

Appendix A - Action Plan

Cultural Action Plan -- March 1997
Robert, Winter 1997

Sometimes when we get hired for a job we will not live or know about the area around the school where we are moving to. We really can't expect all kids to act the same or know the same kinds of things. I grew up in a middle to upper middle class suburb. I know that most of the job opening are in city schools and the city schools pay more so that is probably where I will get my first job. My field placement this semester was in an inner city school. It hardly seemed like the school had any grounds, just building and parking lots. Nothing like the high school that I graduated from. I don't think I really want to teach in that kind of school but if that was the only place I could get a job I could do the following things to get to know about the students in my school.

1. Read the paper and look for references to the streets and areas around the school.
2. Watch the evening news and do a similar thing.
3. Ask other teachers in the building about the area and the students.
4. Read the student news paper if the school has one.
5. Go to sporting events and start talking with parents who attend.
6. Go to a few stores around the school and do most of my shopping there -- see what kinds of things are sold, prices, etc..
7. Visit churches or youth centers and talk to folks.
8. Call the police and get the crime statistics.
9. Drive around the neighborhoods near the school and see what the houses or apartments look like and what kinds of cars people drive.
10. Visit a Realtor and ask them about the area.
11. Visit neighborhood parks and hang out.
12. See if there are any books in the library about the neighborhood or try to find out the history of the area.
13. Ask students what their parents do for a living.
14. Listen in as kids talk in the hall or in class about their lives.

There are probably lots of other things I could do but this is the start of my list. I did some of these things during this field placement and was real surprised that these kids had pretty normal lives.

Appendix B -- Teaching Philosophy

Becoming and Being a Teacher
Lee, Spring 1996

I plan on being a teacher who touches children's lives. I will not be the passive fact machine, just telling students the facts about science or showing them how to work math problems. I want to show them that science and math are all around us and part of almost every part of our lives. Science and math are real not just something found in books. To do this I believe in using day to day examples and problems to teach science and math. USING and DOING are the important parts of teaching math and science.

The journey to becoming a teacher as been a long and varied one for me. I was sure that I wanted to be an engineer, that the real joy in science was using it. I was one of those folks who really believed that those who could did and those who couldn't taught. Plus why go through all that schooling and major in a science field for the lousy pay that teachers get? No way -- not me, I was going to earn big bucks and have a life. Then I started tutoring ...whoops -- this is fun, more fun than spending my days starring at a computer all day. Before I knew it -- it was "Hey Mom and Dad -- I'm changing my major again!"

When I am teaching I don't feel like I'm an actor just playing a role. I get to be myself. I get to show my students by example that it isn't just nerds who like and can do science and math. The students are just going to have to accept me -- goof ups and all. I don't expect them all to love science like I do -- but if they just don't hate it I'll be happy. I want my class to be so enjoyable that they won't know I've been working them hard, and pushing them. I want my students to be life long learners and that mean's I have to show them that I'm always learning too. I have high expectations for myself and I will have high expectations of all of my students.